

Are Physicians Doing Too Much Colonoscopy? A National Survey of Colorectal Surveillance after Polypectomy

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Background: Increasing use of colonoscopy for colorectal cancer screening and surveillance of colorectal adenomas after polypectomy has given rise to concerns about the availability of endoscopic resources in the United States. Guidelines recommend surveillance after polypectomy at 3 to 5 years for a small adenoma, and follow-up is not advised for hyperplastic polyps. The intensity of physicians' surveillance is largely unstudied.

Objective: To survey practicing gastroenterologists and general surgeons about their perceived need for the frequency of surveillance after polypectomy, to compare survey responses to practice guidelines, and to identify factors influencing their recommendations for surveillance.

Design: Survey study conducted by the National Cancer Institute.

Setting: A nationally representative study of physicians in the United States.

Participants: 349 gastroenterologists and 316 general surgeons.

Measurements: Questionnaires mailed in 1999 and 2000 assessed physicians' recommendations for surveillance after polypectomy in asymptomatic, average-risk patients.

Results: Response rates were 83%. Among gastroenterologists (317 of 349) and surgeons (125 of 316) who perform screening colonoscopy, 24% (95% CI, 19.3% to 28.7%) of gastroenterologists and 54% (CI, 44.9% to 62.5%) of surgeons recommend surveillance for a hyperplastic polyp. For a small adenoma, most physicians recommended surveillance colonoscopy and more than 50% recommended examinations every 3 years or more often. Physicians indicated that published evidence was very influential in their practice (83% [CI, 78.8% to 87.2%] of gastroenterologists and 78% [CI, 72.5% to 86.8%] of surgeons). By contrast, only half of respondents reported that guidelines were very influential.

Limitations: The study was based on physicians' self-reported practice patterns. Results may overestimate or underestimate the performance of surveillance colonoscopy.

Conclusions: Some surveillance colonoscopy seems to be inappropriately performed and in excess of guidelines, particularly for hyperplastic polyps and low-risk lesions such as a small adenoma. These results suggest unnecessary demand for endoscopic resources.

Ann Intern Med. 2004;141:264-271.

www.annals.org

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Colonoscopy is being increasingly used in colorectal cancer screening (1, 2). This increased usage is based on recent studies and commentary (3–5), the endorsement of organizations that develop guidelines (6–8), celebrity promotion (9), and third-party payer reimbursement (10, 11). Polyp detection from the performance of colonoscopy is likely to increase surveillance, which has concerned some policymakers because physician manpower and resources may not be adequate to meet the demand for colonoscopy (2, 12–15). Some researchers have suggested redirecting resources from low-risk to high-risk persons to increase the overall effect of programs of colorectal cancer screening and surveillance (6).

Screening studies for colorectal cancer have shown adenoma detection in 20% to 30% of average-risk persons age 50 years and older (3, 4, 16). However, almost three quarters of persons with lesions identified during screening have only 1 to 2 small (<1 cm) tubular adenomas (3) (Pickhardt PJ. Personal communication), for which subsequent risk for colorectal cancer may be minimal (17). A hyperplastic polyp, a benign nonneoplastic lesion, is often identified in 10% or more of persons screened (3, 4, 18–21). In 1999, the surveillance of neoplasia accounted for approximately 25% of the estimated 4.4 million colonoscopies performed annually by gastroenterologists in the United States (14, 22). In persons with lesions that do not confer an increased future risk for colorectal cancer, such as hyperplastic polyps or small adenomas, surveillance may be

overperformed (6, 14, 20, 21, 23). Clinical practice guidelines for adenoma surveillance typically recommend colonoscopy at 3 years after finding a large adenoma and at 3 to 5 years after detection of a small adenoma; surveillance is not recommended for a hyperplastic polyp (Table 1) (23–27).

To understand the physician and health system factors that influence the effective use of colorectal cancer screening and surveillance, the National Cancer Institute conducted the Survey of Colorectal Cancer Screening Practices in Health Care Organizations. In this report, we describe how gastroenterologists and general surgeons recommend surveillance of various polyps detected during screening colonoscopy and compare their recommendations to published clinical practice guidelines from medical societies and professional organizations.

METHODS

Survey Content and Participants

The National Cancer Institute, in collaboration with the Centers for Medicare & Medicaid Services and the Centers for Disease Control and Prevention, conducted the Survey of Colorectal Cancer Screening Practices in Health Care Organizations (28). This survey was a comprehensive study of primary care and specialty physicians and health plan medical directors; it was designed to obtain nationally representative data on how colorectal cancer

screening and surveillance were being conducted in the United States and to identify barriers to implementation in community practice.

Using the American Medical Association's Physician Masterfile as the sampling frame, we surveyed a nationally representative sample of gastroenterologists and general surgeons in 1999 and 2000. The Masterfile contains demographic and practice-related data on all allopathic and almost all osteopathic physicians in the United States. Eligible respondents were identified from the database as being 75 years of age and younger, having an active license to practice medicine, and reporting patient care as their primary professional activity. We selected a systematic stratified random sample of 467 gastroenterologists and 467 general surgeons by using a fractional sampling interval after the sampling frame database was sorted by U.S. Census region (Northeast, North Central, South, and West), urban versus rural practice location, and sex of the physician. This sample size was selected to provide point estimates of population proportions within a 5% range at a 95% CI. Gastroenterologists were oversampled relative to their representation in the U.S. physician population to ensure sufficient numbers to make separate estimates by specialty. Of the initial sample, 131 physicians were subsequently determined to have retired or died, to not be currently practicing medicine, or to be unlocatable after an extensive search for current contact information. Exclusion of these physicians left 421 eligible gastroenterologists and 382 general surgeons. In the fall of 1999, we sent sampled physicians an advance mailing that contained a cover letter describing the objectives of the survey, letters of support from 5 medical societies and the U.S. Surgeon General, and a postcard with which physicians were asked to verify their specialty and practice status and indicate their preferred mode of response to the survey (mail, fax, telephone, or Internet). Physicians who responded to the advance mailing were sent a subsequent mailing that included the mail or fax version of the questionnaire or instructions on how to complete the survey by telephone or Internet, depending on their stated preference. Approximately 6 weeks later, a follow-up mailing that contained the questionnaire was sent to physicians who did not respond to the advance mailing. We made telephone calls to nonrespondents in March and early April 2000. All respondents received a prepaid \$50 honorarium for their participation.

The survey consisted of 40 questions and took approximately 20 minutes to complete. Items of the survey queried physicians regarding their beliefs about colorectal cancer screening and their opinions and practices specific to asymptomatic, average-risk patients. To assess physicians' recommendations for surveillance after polypectomy, the survey presented 4 clinical scenarios that described a healthy 50-year-old average-risk patient who had undergone colonoscopy during which 1 of the following lesions was detected: 1) hyperplastic polyp, 2) adenomatous polyp less than 1 cm in diameter, 3) adenomatous polyp 1 cm or

Context

Colonoscopic surveillance following colon polypectomy is costly in terms of money and manpower. Clinical practice guidelines recommend different surveillance intervals after polypectomy, depending on the size, number, and histologic characteristics of the polyps identified; however, actual adherence to the guidelines is unknown.

Contribution

This nationally representative survey of gastroenterologists and general surgeons shows that physicians recommend surveillance colonoscopy much more frequently than clinical guidelines suggest, especially for hyperplastic polyps and small adenomas.

Implications

Unjustified overuse of surveillance colonoscopy after polypectomy seems to be widespread; this situation threatens to overwhelm the money and resources available for health care maintenance.

—The Editors

greater in diameter, and 4) multiple (≥ 3) adenomas. The term *surveillance* was defined at the beginning of the survey: the procedure or procedures used to periodically examine the colon after detection and removal of a precancerous lesion by screening or other means.

We asked physicians to indicate (in open-ended written responses) which of the following procedures they were most likely to recommend for surveillance after polypectomy: fecal occult blood test, flexible sigmoidoscopy, colonoscopy, double-contrast barium enema, or none (routine screening). They were also asked about the frequency with which the procedure would be performed, recorded as a specific time interval (for example, every 3 years) or a range of time (for example, 3 to 5 years). We used published recommendations as a guide to summarize these open-ended responses for analysis of time points and intervals. When intervals overlapped, we counted the responses in the category of the longer time interval. For example, a response of 2 to 4 years would be counted in the 3- to 5-year interval rather than the 1- to 3-year interval. Incomplete items in the survey were counted as a "no response."

We also asked physicians to rate (using a 3-point Likert scale) the familiarity of and the extent to which various published guidelines influenced their practice of colorectal cancer screening and surveillance. The categories in the scale were "very influential," "somewhat influential," and "not influential." Similarly, we asked physicians to rate the influence of such factors as "published clinical evidence," "continuing medical education," and "availability of reimbursement by third-party payers." Details of the survey design and administration, as well as the exact wording of all survey items, are available at www.healthservices.cancer.gov/surveys/colorectal/.

Table 1. Guidelines for Colonoscopic Surveillance Intervals after Polypectomy*

Polyp Type	Gastroenterology Consortium, 1997 (23)†	ASGE, 1997 (24)	ACS, 1997 (25)
Hyperplastic polyp	Not recommended	Not addressed	Not addressed
Single adenoma (<1 cm)	No recommendation§	Examination every 3–5 y	Examination every 3 y If negative, resume average risk recommendations
Single adenoma (≥1 cm)	Examination every 3 y If negative, extend to 5 y	Examination every 3 y	Examination every 3 y If negative, extend to 5 y
Multiple adenomas (≥2)	Examination every 3 y	Examination every 3 y If negative, extend to 5 y	Examination every 3 y If negative, extend to 5 y

* ACS = American Cancer Society; ASCRS = American Society for Colon and Rectal Surgeons; ASGE = American Society for Gastrointestinal Endoscopy; SAGES = Society of American Gastrointestinal Endoscopic Surgeons.

† The Consortium consists of the American Gastroenterology Association, American Society for Gastrointestinal Endoscopy, American Society for Colon and Rectal Surgeons, American College of Gastroenterology, and Society of American Gastrointestinal Endoscopic Surgeons.

‡ SAGES coendorsed the ASGE guideline.

§ Guideline text reads as follows: “Small, tubular adenomas . . . are associated with a risk of colorectal cancer no greater than the general population” and “. . . patients with tubular adenomas <1 cm . . . should decide with their physicians whether to undergo colonoscopy.”

|| If surveillance examination reveals a small tubular adenoma or no adenoma, surveillance may be extended to every 5 years.

Statistical Analysis

We used descriptive statistics to examine recommended surveillance procedures, frequency intervals, and the influence of clinical practice guidelines and other factors. Ninety-five percent CIs were calculated for all estimates. We applied sample weights in the analysis to permit generalization of the results to the U.S. population of practicing gastroenterologists and general surgeons. We as-

signed each respondent a sample weight that accounted for selection into the sample as well as a slightly higher rate of nonresponse among physicians age 60 years and older. All analyses were based on weighted survey data, although weighted and unweighted data were very similar because of the high response rate. The similarity in results between the weighted and unweighted data also indicates that characteristics of physicians who responded to the survey did not differ greatly from those of physicians who did not respond. Analyses were stratified according to the 2 specialty groups represented in this survey. To provide nationally representative estimates and to account for the sampling design of the survey, all analyses were performed by using SUDAAN statistical software and survey weights (Research Triangle Institute, Research Triangle Park, North Carolina).

Role of the Funding Source

The funding source had a role in the design, conduct, and reporting of the study and in the decision to submit the manuscript for publication.

RESULTS

Description of Respondents

The overall rate of response to the survey was 83% (349 gastroenterologists and 316 general surgeons). Most physicians responded by mail (83%); 7% responded through the Internet, 7% responded by fax, and 3% responded by telephone interview. The analysis involved physicians who either performed screening colonoscopy or supervised nonphysician clinicians (that is, a nurse practitioner or physician assistant) performing screening colonoscopy. The final study group (**Figure**) consisted of 317 gastroenterologists and 125 general surgeons. **Table 2** presents the characteristics of the respondents.

Table 2. Physician and Practice Characteristics, by Specialty

Characteristic	Gastroenterology (n = 317)	General Surgery (n = 125)
Men, n (%)	296 (93.3)	120 (96.0)
Mean age (range), y	46.6 (32–73)	51.6 (32–75)
White, non-Hispanic race, n (%)	237 (74.7)	94 (75.2)
Board certification, n (%)	295 (93.0)	95 (76.0)
Practice region, n (%)		
Northeast	87 (27.4)	19 (15.2)
North Central	59 (18.6)	40 (32.0)
South	108 (34.1)	48 (38.4)
West	63 (19.8)	18 (14.4)
Metropolitan location of practice, n (%)	224 (70.6)	44 (35.2)
Medical school affiliation, n (%)	157 (49.5)	37 (29.6)
Single specialty practice, n (%)	156 (49.2)	41 (32.8)
Full or part owner of practice, n (%)	238 (75.1)	105 (84.0)
Practice with >50% of patients covered by managed care, n (%)	128 (40.4)	38 (30.4)
Solo practice setting, n (%)	70 (22.1)	45 (36.0)
Practice volume of ≤50 patients/wk, n (%)	62 (19.5)	52 (41.6)
Number of screening colonoscopies performed/mo, n (%)		
≤10	152 (47.9)	107 (85.6)
11–19	70 (22.1)	8 (6.4)
≥20	86 (27.1)	4 (3.2)
No response	9 (2.8)	6 (4.8)
Number of diagnostic colonoscopies performed/mo, n (%)		
≤10	38 (12.0)	95 (76.0)
11–19	91 (28.7)	21 (16.8)
≥20	181 (57.1)	6 (4.8)
No response	7 (2.2)	3 (2.4)

Table 1—Continued

ASCRS, 1999 (26)	SAGES, 1997 (27)†
Not recommended	Not addressed
Examination every 3–5 y	Examination every 3–5 y
Examination every y	Examination every 3–5 y
If negative, extend to 5 y	
Examination every y	Examination every 3–5 y
If negative, extend to 5 y	

Surveillance Recommendations Based on Polyp Type

Hyperplastic Polyp

As described in Table 3, after the detection and removal of a hyperplastic polyp, 24% (95% CI, 19.3% to 28.7%) of gastroenterologists recommended surveillance colonoscopy alone or in combination with another colorectal cancer test (fecal occult blood test, sigmoidoscopy, or double-contrast barium enema), and most of these physicians (62% [CI, 50.9% to 72.8%]) reported that they would perform this procedure every 5 years or sooner. Among general surgeons who recommended colonoscopy (54% [CI, 44.9% to 62.5%]), almost all would perform surveillance at a frequency of every 5 years or more often. Of note, very few respondents included double-contrast

barium as a recommended surveillance procedure for this lesion or for adenomas.

Small Adenoma

For the follow-up after the detection and removal of a single small (<1 cm) adenoma, 97% (CI, 94.5% to 98.6%) of gastroenterologists indicated that they would recommend surveillance colonoscopy with or without an additional colorectal cancer examination. More than half of gastroenterologists said that they would perform endoscopic surveillance every 3 years or sooner. General surgeons recommended a similar surveillance practice.

Large Adenoma and Multiple Adenomas

For follow-up after the detection and removal of a large (≥ 1 cm) adenoma or multiple adenomas (≥ 3), almost all physicians recommended surveillance colonoscopy at a frequency of every 3 years or more often. Nearly half of gastroenterologists (47% [CI, 41.4% to 52.6%]) recommended surveillance colonoscopy for multiple adenomas at a frequency of 1 to 3 years, whereas 78% (CI, 70.5% to 85.5%) of surgeons recommended surveillance more often than once every 3 years.

Factors Rated as Very Influential on Clinical Practice

As shown in Table 4, most physicians reported that published clinical evidence was very influential in determining clinical practice and that this influence was considerably greater than that of published guidelines, including recommendations from within their specialty society.

Figure. Flow diagram of the study.

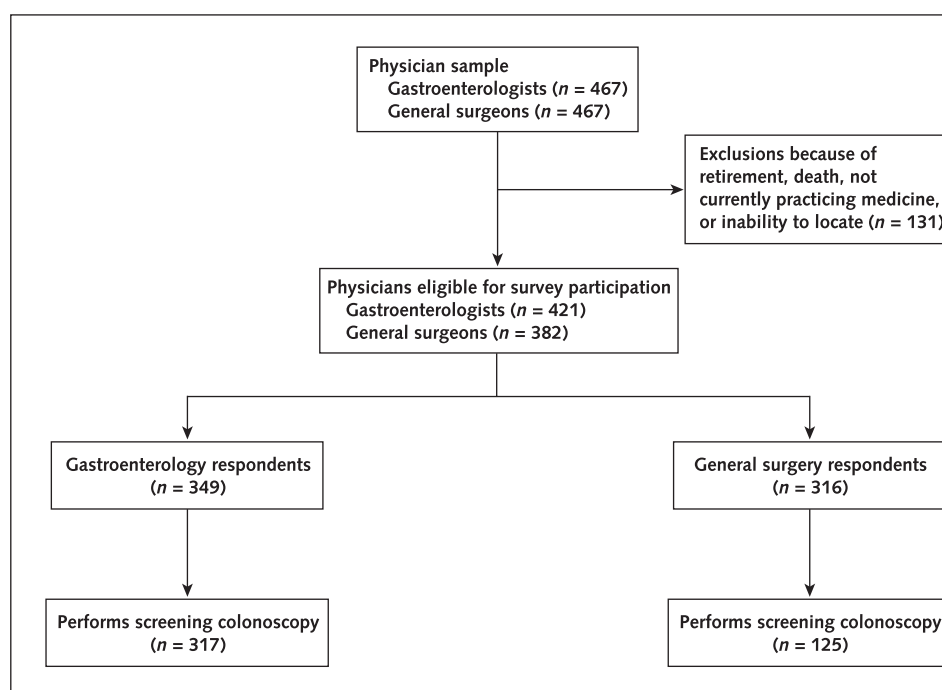


Table 3. Surveillance Procedures Recommended by Physicians for Lesions Identified in Average-Risk Patients

Surveillance	Hyperplastic Polyp [95% CI], % (n/n)		Small Adenoma (<1 cm) [95% CI], % (n/n)	
	Gastroenterologist	General Surgeon	Gastroenterologist	General Surgeon
Procedure type				
None recommended	26.5 [21.6–31.4] (84/317)	20.7 [13.6–27.8] (26/125)	1.3 [0.0–2.5] (4/317)	1.0 [0.0–2.3] (1/125)
One or more procedures recommended				
Colonoscopy only	13.9 [10.1–17.7] (44/317)	28.7 [13.6–27.8] (35/125)	69.1 [64.0–74.2] (219/317)	47.9 [39.2–56.7] (60/125)
Colonoscopy with fecal occult blood testing or sigmoidoscopy or double-contrast barium enema	10.1 [6.8–13.4] (32/317)	25.0 [17.4–32.6] (32/125)	27.4 [22.5–32.4] (87/317)	40.6 [32.0–49.2] (51/125)
Fecal occult blood testing or sigmoidoscopy or double-contrast barium enema	47.9 [42.4–53.4] (152/317)	20.8 [13.6–27.8] (25/125)	1.2 [0.0–2.4] (4/317)	8.2 [3.3–13.1] (10/125)
No response	1.6 [0.2–2.9] (5/317)	5.0 [1.1–8.9] (6/125)	1.0 [0.0–2.0] (3/317)	2.5 [0.0–5.3] (3/125)
Frequency				
Colonoscopy				
Every 1–3 y	6.6 [1.0–12.2] (5/76)	43.0 [31.1–54.8] (29/67)	11.1 [7.6–14.7] (34/306)	65.7 [56.9–74.6] (73/111)
Every 3 y	10.6 [3.6–17.5] (8/76)	22.7 [12.6–32.8] (15/67)	42.6 [37.0–48.1] (130/306)	20.8 [13.2–28.3] (23/111)
Every 3–5 y	44.7 [33.5–55.9] (34/76)	29.8 [18.9–40.8] (20/67)	42.4 [36.8–47.9] (130/306)	11.7 [5.7–17.6] (13/111)
Every 5–10 y	34.2 [23.5–44.8] (26/76)	4.5 [0.0–9.5] (3/67)	3.6 [1.5–5.6] (11/306)	1.0 [0.0–2.6] (1/111)
No response	4.0 [0.0–8.4] (3/76)	0	1.0 [0.0–0.9] (1/306)	1.0 [0.0–2.8] (1/111)
Sigmoidoscopy				
Every 2 y or less	3.9 [0.8–7.0] (6/153)	49.7 [30.4–68.9] (13/26)	49.7 [9.7–89.8] (3/6)	62.8 [39.1–86.5] (10/16)
Every 3–5 y	96.1 [93.0–99.2] (147/153)	46.2 [27.0–65.4] (12/26)	33.8 [0.0–71.8] (2/6)	37.2 [13.5–60.9] (6/16)
Every 10 y	0	4.1 [0.0–12.1] (1/26)	0	0
No response	0	0	16.5 [0.0–46.2] (1/6)	0
Fecal occult blood testing				
Every 1–2 y	92.7 [88.7–96.7] (152/164)	96.1 [90.7–100.0] (50/52)	90.8 [84.7–96.9] (79/87)	94.4 [88.3–100.0] (53/56)
Every 3–5 y	4.9 [1.6–8.2] (8/164)	3.9 [0.0–9.3] (2/52)	5.7 [0.8–10.6] (5/87)	1.9 [0.0–5.6] (1/56)
No response	2.5 [0.1–4.9] (4/164)	0	3.5 [0.0–7.4] (3/87)	3.7 [0.0–8.7] (2/56)

DISCUSSION

This national study of gastroenterologists and general surgeons provides important insight into physicians' recommendations for surveillance after polypectomy in the United States. The findings suggest considerable overperformance of surveillance colonoscopy when compared with published guidelines and raise questions about the extent of influence of evidence-based guidelines. If physicians perform surveillance colonoscopy as intensively as this survey suggests, substantial resources for endoscopic surveillance will be used in low-risk persons (that is, those with a hyperplastic polyp or a small adenoma), who are less likely to benefit but will consume critical resources.

The rationale for colonoscopic surveillance is based on the high rate of detection of recurrent colorectal adenomas, estimated at 30% to 50% (29–32). However, studies within the past decade have provided important evidence about the wide variation in risk for the subsequent development of colorectal cancer among patients with adenomas. In addition, these studies have served as the basis for the formation of guideline recommendations. The risk for subsequent colorectal cancer in patients with a small adenoma may be no greater than the risk in the general population (17); this finding suggests that the benefits of intensive surveillance colonoscopy in these persons would be limited. Some evidence suggests that the initial detection

and removal of an adenoma, rather than subsequent surveillance, reduces the risk for colorectal cancer (33).

A substantially larger proportion of physicians reported that their recommendations were much more influenced by published evidence than by practice guidelines. However, the actual evidence supporting these physicians' decision to recommend intensive surveillance of a hyperplastic polyp or small adenoma remains unclear. Our findings may indicate the existing barriers in physicians' adherence to clinical practice published guidelines, which is consistent with findings of previous research (34–36).

An additional finding of interest is the variability in guidelines among professional societies (Table 1). For example, several professional societies recommend a surveillance interval of every 3 years or every 3 to 5 years for a small adenoma (24–27). However, other organizations have reported that the risk for subsequent colorectal carcinoma in persons with a small tubular adenoma (for example, one that is detected during sigmoidoscopy) is not increased and, therefore, decisions regarding additional colonoscopy (work-up and surveillance) could be made on an individual basis (23, 37). For large or multiple adenomas, most clinical guidelines recommend similar intervals for surveillance (3 to 5 years), but some have endorsed annual colonoscopy (26, 38). Guideline inconsistency or rationale for disagreement may be important factors in

Table 3—Continued

Large Adenoma (≥ 1 cm) [95% CI], % (n/n)		Multiple Adenomas (≥ 3 cm) [95% CI], % (n/n)	
Gastroenterologist	General Surgeon	Gastroenterologist	General Surgeon
1.0 [0.0–1.5] (2/317)	0	1.0 [0.0–1.5] (2/317)	0
72.5 [67.6–77.5] (230/317)	55.3 [46.5–64.0] (69/125)	74.8 [70.0–79.6] (237/317)	57.0 [48.3–65.7] (71/125)
24.3 [19.6–29.0] (77/317)	37.5 [29.0–46.0] (47/125)	22.4 [17.8–27.0] (71/317)	38.1 [29.6–46.6] (48/125)
1.6 [0.2–3.0] (5/317)	4.8 [1.0–8.5] (6/125)	1.2 [0.0–2.5] (4/317)	1.6 [0.0–3.7] (2/125)
1.0 [0.0–2.0] (3/317)	2.5 [0.0–5.3] (3/125)	1.0 [0.0–2.0] (3/317)	3.3 [0.1–6.6] (4/125)
21.8 [17.2–26.4] (67/307)	71.4 [63.2–79.7] (83/116)	47.0 [41.4–52.6] (145/308)	78.0 [70.5–85.5] (93/119)
54.4 [48.8–60.0] (167/307)	18.1 [11.1–25.2] (21/116)	41.6 [36.1–47.1] (128/308)	12.7 [6.7–18.8] (15/119)
23.1 [18.4–27.9] (71/307)	9.5 [4.2–14.9] (11/116)	8.1 [5.1–11.2] (25/308)	5.9 [1.7–10.2] (7/119)
0	0	0	0
1.0 [0.0–1.5] (2/307)	1.0 [0.0–2.7] (1/116)	3.2 [1.3–5.2] (10/308)	3.5 [0.1–6.6] (4/119)
71.1 [37.4–100.0] (5/7)	91.1 [74.3–100.0] (10/11)	66.7 [29.0–100] (4/6)	80.4 [45.7–100] (4/5)
28.9 [0.0–62.6] (2/7)	8.9 [0.0–25.7] (1/11)	33.8 [0.0–71.8] (2/6)	19.6 [0.0–54.3] (1/5)
0	0	0	0
0	0	0	0
96.2 [91.9–100.0] (74/77)	96.0 [90.5–100.0] (47/49)	90.4 [83.6–97.2] (66/73)	93.8 [86.9–100.0] (46/49)
0	0	1.4 [0.0–4.1] (1/73)	2.0 [0.0–5.9] (1/49)
3.8 [0.0–8.1] (3/77)	4.0 [0.0–9.5] (2/49)	8.2 [1.9–14.6] (6/73)	4.2 [0.0–9.9] (2/49)

influencing physician adherence to practice recommendations.

Forces in the practice environment may be important factors affecting physician behavior. These include concern about medical liability, community influence, regional practice variations, third-party payment, and financial incentives (39–41). An additional important factor may be physician education, that is, knowledge of practice guidelines or ability to interpret published evidence (34, 42). Although respondents in this study reported that reimbursement was not an influential consideration, other studies, including one that examined surveillance for Barrett esophagus, reported that payment policies strongly influence health care practices (36, 43).

Overuse of colonoscopy could affect quality of care.

First, long waiting times of several months, already occurring in some parts of the country (12, 15), may translate to reduced access for symptomatic patients and those with limited means to obtain a needed colonoscopy examination (13). Second, patient safety concerns are magnified when a person with a low risk for colorectal cancer is exposed to a high cumulative risk for complications from procedures (44). For persons of average risk or below-average risk (for example, those with repeated negative results on surveillance examinations), the cumulative complication rate from surveillance colonoscopy could offset the benefit in colorectal cancer reduction (45).

The strength of our study is that it is based on a large, nationally representative survey of physicians and a high response rate. Limitations are that it is based on self-

Table 4. Guidelines and Other Factors Reported as Very Influential in Practice, by Specialty*

Influential Factor	Gastroenterology	General Surgery
Clinical evidence published in the medical literature	83.1 (78.9–87.2)	79.7 (72.5–86.8)
Guidelines		
Gastroenterology Consortium guidelines (1997)†	54.6 (49.1–60.1)	19.5 (12.5–26.5)
American Cancer Society guidelines (1997)	53.6 (48.1–59.1)	49.4 (40.6–58.2)
Other specialty society guidelines	31.0 (25.8–36.3)	23.4 (15.8–31.0)
Continuing medical education, conferences, and meetings	43.9 (38.4–49.4)	53.8 (45.0–62.5)
Availability of reimbursement by third-party payers	35.0 (29.7–40.3)	13.0 (7.0–18.9)

* Values in parentheses are 95% CIs.

† The Consortium consists of the American Gastroenterology Association, American Society for Gastrointestinal Endoscopy, American Society for Colon and Rectal Surgeons, American College of Gastroenterology, and Society of American Gastrointestinal Endoscopic Surgeons.

reported practice patterns of physicians, that it does not contain clinical detail, and that it reports practices that are not verified by chart audits. Physicians may either overestimate or underestimate clinical behaviors compared with actual recorded performance (46). Practice patterns may differ when histologic characteristics of the polyp, technical endoscopic issues, and patient characteristics are taken into account. In our study, the survey response may actually have underestimated the magnitude of the overuse of surveillance colonoscopy if physicians did not report behaviors that might be perceived as incorrect. Because other detailed data on current colonoscopy use are limited, our study provides important information on the practice behaviors of providers and the potential effect of these behaviors on health care resource allocation. For example, files for Medicare claims are mainly limited to enrollees older than 65 years of age and lack detailed information on polyp size, histologic features, and number. The Clinical Outcomes Research Initiative database, a central data repository for endoscopic procedures, is limited to self-selected physician groups and depends on the availability of specific computer programs (2, 22). Last, we observed differences in recommended surveillance practices between gastroenterologists and general surgeons. Gastroenterologists were younger, had a higher rate of board certification, and were characterized by urban, single-specialty group practices. In addition, guideline recommendations differed across the respective professional groups. Both of these findings may explain a somewhat less intensive pattern of recommended surveillance by gastroenterologists. This study, however, was not intended to contrast differences between physician groups; our results show that both groups recommended surveillance intervals that were far more intensive than those recommended by guidelines. In addition, although gastroenterologists perform most endoscopic procedures in the United States, our results revealed that 40% of general surgeons surveyed perform some screening colonoscopy, thus indicating the contribution by this group of physicians to colonoscopy delivery. It is estimated that one third of screening and diagnostic colonoscopy is being performed by general surgeons in the United States (47).

Recently, new clinical guidelines propose shifting colonoscopy resources away from surveillance of low-risk persons to screening as a way to increase the overall effect of available resources on colorectal cancer incidence and mortality (6). The results of our study provide an opportunity for policymakers and professional societies to examine the role and influence of clinical practice guidelines in the medical community and to consider promoting improved guideline understanding, consensus, and implementation. Such efforts will probably involve developing transparent practice guidelines from an adequate evidence base, identifying barriers to the adoption of guideline recommendations, and promoting delivery systems shown to be effective in the adherence of recommendations. The combined efforts of policymakers and practitioners can re-

sult in the effective utilization of resources and the rendering of optimal patient care.

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Grant Support: By the National Cancer Institute (contract no. N01-PC-85169).

Potential Financial Conflicts of Interest: None disclosed.

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Obtaining of funding: M.L. Brown, C.N. Klabunde.

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